Fact Sheet:

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Pipe Corrosion Inspection Crawler

The Problem

Piping systems underground and in buildings must be inspected for corrosion damage before repairs can be made. Corrosion damage to small diameter (two inches or less) pipes, heat exchangers, boiler tubes, etc., is difficult to assess since nearly all technology to date focuses on larger pipes. A corrosion inspection crawler would save the Army time and money by producing a permanent record of the corrosion status of small diameter pipes and eliminating the need for destructive testing.

The Technology

The U.S. Army Construction Engineering Research Laboratories (CERL) is developing a pipe inspection crawler for inside inspection of two inch diameter water pipes and steam condensate return lines. The crawler is being designed to negotiate a right angle turn and to carry an optical video probe. The optical video probe allows visual inspection of the inside surface of the pipe. The image of interest is sent to a monitor for display and analysis.

Once an area of corrosion damage has been detected using the optical probe, a sensor is used to evaluate the corrosion pit depth. Several sensors have been investigated. It has been determined the most widely useful technique is quantitative computer-aided video image analysis. The collected data can either

be used in a real-time measurement and signal processing system to provide on-line depth information, or stored and later examined using a variety of spreadsheet and analysis software packages.

Benefits/Savings

CERL's pipe inspection crawler will save the Army time and money by producing a permanent record of the corrosion status of pipes. This will allow potential problems to be pinpointed and remedied before failures occur. This technology avoids the costly and lengthy shutdown of pipelines currently used for corrosion status evaluation. Since the crawler is easy to operate, frequent inspections can be made to detect problems in their early stages. The visual inspection eliminates the need for the costly destructive testing of pipes.

Status

Wheeled prototypes for the pipe inspection crawler have been tested in the laboratory in previous years. In addition, several potential sensors have been explored. A remote field eddy current sensor was field tested on condensate return lines at Aberdeen Proving Ground, MD. Laboratory tests were conducted on a capacitance proximity sensor and on a linear variable differential transformer (LVDT).

A new device known as "Pneu-Worm," which can travel vertically and negotiate multiple ninety degree bends, is being integrated with CERL video image analysis technology. This device is currently being fabricated.

Points of Contact

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